IM-1349

AN INDUCTOTHERM COMPANY

INSTRUCTION BOOK

FOR

AUDIO MIXER AMPLIFIER ASSEMBLY

TYPE MAA-8/600

G. R. M. CORPORATION

Triangle Industrial Center

Medford, New Jersey 08055

Phone (609) 267-7950

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SAFETY NOTICE

The attention of operating and maintenance personnel is directed to AF P 6030.5 Maintenance of Electronics Equipment or superseding document for instructions on the subject of radio-safety precautions to be observed.

This equipment employs voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working with the equipment.

While every practicable safety precaution has been incorporated in this equipment, the following rules must be strictly observed.

KEEP AWAY FROM LIVE CIRCUITS:

Operating and maintenance personnel must at all times observe all safety regulations. Do not change plug-in components or make adjustments inside equipment with high voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors. To avoid casualties always remove power, then discharge and ground by use of grounding rod, prior to touching any parts.

DON'T TAMPER WITH INTERLOCKS:

Do not depend upon door switches or interlocks for protection but always shut down high-voltage rectifiers and other power equipment. Under no circumstances should any access gate, door, or safety interlock switch be removed, short-circuited, or tampered with in any way, except by authorized maintenance personnel when considered unavoidable, nor should reliance be placed upon the interlock switches for removing voltages from the equipment. The grounding rod should always be employed (after shutting off all power) to insure that circuits are electrically "dead".

RESUSCITATION:

Maintenance personnel should familiarize themselves with the technique for resuscitation found in the Manual of First Aid Instructions.

PRECAUTIONARY NOTICE SEMICONDUCTORS

DEVICES/INTEGRATED CIRCUITS

This equipment contains semiconductors/integrated circuits; see page 6 - 1 before attempting to service.

GUARANTEE

All necessary adjustments of machines procured hereunder, not occasioned by accident or misuse, shall be made by G. R. M. Corporation at its own expense, including transportation costs, if any, during the 90-day period after delivery. All machines procured hereunder are guaranteed for a period of 1 year from date of delivery, except expendable items such as tubes, transistors, etc. which are guaranteed for 90 days from date of delivery. During the guarantee period, all broken or defective parts not caused by accident or misuse through fault of negligence by the purchaser will be replaced (including labor and parts) at the expense of G. R. M. Corporation including transportation costs, if any.

The purchaser shall not return defective equipment to G. R. M. Corporation or its service centers for adjustments, repairs, or replacements without prior authorization and instructions directed only from the factory. G. R. M. Corporation will not accept collect calls or telegrams; all such communications are to be made at the expense of the purchaser. The purchaser should maintain original shipping cartons for said shipments, or if elected, prepare new cartons at the expense of the purchaser.

MODEL MAA-8/600
AUDIO MIXING AMPLIFIER ASSEMBLY

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AUDIO MIXING AMPLIFIER

SUMMARY SHEET

Audio Frequency Response	300 CPS to 3000 CPS within 2 DB
Input Impedance	6000 OHMS ± 5%
Output Impedance	Balanced 600 OHMS
Input Levels	
Channel 1	+10 DBM
Channel 2	-20 DBM
Channel 3	+6 DBM
Channel 4	-48 DBM
Overall Gain of Amplifier	58 DB
Output Level	10 DBM within 2 DB
Power Requirements	
AC Line Voltage	102V to 138V
AC Line Frequency	60 CPS - 1 Phase
Wattage	15 Watts
Model MAA-8/600 Mixing Amplifier Assembly	
Main Chassis Model MAC-8	1 Each
Power Supply Model PS-12018	1 Each
Mixing Amplifier Model MA-8/600	8 Each
Accessories Furnished	2 ft. Power Input Cord
Power Supply	
Fuse	1 Ea. 3/8 amp. delayed action
Diode	4 Ea.
Zener Diode	2 Ea.
Mixing Amplifier	
Integrated Circuits	Two-Type μA709T
Test Equipment Covered By This Manual	Extender Board Model EM-8/600
Weight of Equipment	
Mixing Amplifier Assembly	15 lb. 2 oz.
Mixing Amplifier	10 oz.
Power Supply	1 lb.11 oz.
Extender Board	7 oz.

SECTION 1. GENERAL DESCRIPTION

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1. INTRODUCTION.

1.1 General. This section contains a brief description of the equipment, the general mechanical construction, and the basic principles of operation.

1.2 Equipment Titles. Hereafter, the Audio Mixing Amplifier will be referred to as the Mix-Amp Assembly, the Mixing Amplifier as a Mix-Amp, the Power Supply as the Power Supply, and the Main Chassis and Panel Assembly will be referred to as the Main Chassis.

2. AUDIO MIXER AMPLIFIER ASSEMBLY.

2.1 General. (See photo 8-1). The Mix-Amp Assembly is a solid state device designed to accept a total of 32 separate input signals and combine these into eight separate output circuits. The Mix-Amp assembly consists of eight identical plug-in mixing amplifiers, and one plug-in power supply, all mounted in the Main Chassis. The Main Chassis is designed for installation in a standard electronic rack assembly. An Extender Board, for testing, is not supplied as part of the equipment.

2.2 Configurations. Eight Mix-Amps and one Power Supply slide into the base assembly side-by-side, with the Power Supply located on the extreme left side. A design feature prevents interchanging a Mix-Amp with the Power Supply and vice-versa.

2.3 The Main Chassis. The Main Chassis mounts in the standard 19 inch equipment rack. The Main Chassis includes the necessary slide tracks and space for easily installing the Power Supply and eight Mix-Amps. Mating plugs for each of the eight Mix-Amps and the Power Supply are located at the inside rear of the Main Chassis. Interconnecting cabling is also located at the inside rear of the Main Chassis. The Main Chassis plugs are mechanically keyed to prevent the accidental interchanging of the Power Supply with a Mix-Amp. On the outside rear of the Main Chassis is the two-foot cable for input AC power and the input and output signal connectors. (See photo 8-2).

2.4 Extender Board. (See photo 8-8). The Extender Board is a separate assembly. The Extender Board will mate with either a Mix-Amp or the Power Supply. When the Extender Board is properly installed the circuitry of the Mix-Amp or the Power Supply becomes accessible for servicing.

2.5 Electrical. Input signals to the Mix-Amp Assembly, as well as power input, are through an Amphenol connector and cable assembly or "wiring harness." Input power of 120 VAC is converted to +12 VDC and -12 VDC with respect to ground by the Power Supply and routed to each of the Mix-Amps.

3. MIXER AMPLIFIER.

3.1 General. The Mix-Amp is a long rectangular box-like unit, the front panel of which is approximately 1-11/16 inch wide and two inches high. The overall length is approximately 10-3/8 inches.

3.2 Front Panel. Five insulated test jacks are mounted on the front panel. Their purpose is to provide conveniently located test points for checking both the internal input circuits, and the output circuit of the Mix-Amp, while it is in operation. The adjusting screws of the four gain control potentiometers are also located on the front panel.

3.3 Mix-Amp Chassis. The Mix-Amp Chassis provides vertical mounting for the printed circuit board and its solid state components. A mate type multi-pin connector is mounted in the rear panel of the chassis, and provides connections for all input and output circuits to and from the Mix-Amp. The chassis is accurately constructed to slide on guide rails for positive alignment of the plug-in unit with a female type connector on the rear panel of the amplifier Main Chassis.

4. POWER SUPPLY.

4.1 General. The Power Supply provides the DC power required to operate the Mix-Amps. It converts the 120 VAC input to the two DC outputs of +12 and -12 VDC with respect to ground.

4.2 Details. Included as circuit components in the Power Supply are an input transformer, a solid state rectifier pair, and automatic voltage regulation circuitry. Components in the Power Supply are mounted on a printed circuit card with input and output connections in a multi-connector interconnection plug at the rear of the printed circuit card. On the front panel of the Power Supply are mounted a fuse, an indicating lamp, a control switch, and DC output test point. When the Power Supply is inserted into the Main Chassis, the interconnection plug at the rear of the Power Supply printed circuit card makes connection with a plug on the inside of the Main Chassis. All connections to the Power Supply are made through the interconnecting plugs: input AC power and output DC power.

SECTION 2. THEORY OF OPERATION

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1. INTRODUCTION.

1.1 General. This section includes the detailed circuit descriptions of the Mix-Amps and Power Supply. See figures 2-1 and 2-2 for referenced material discussed in the following paragraphs.

1.2 Power Supply. The power supply includes a conventional transformer supplying two sets of silicon diode rectifiers operating in a full wave circuit. This provides both a negative and positive output of 12 volts. A separate resistance-capacitance filter and voltage regulator diode is employed to provide filtering and voltage regulation for positive and negative output voltages.

1.3 Mix-Amp. The Mix-Amps use two integrated circuit operational amplifiers employing large amounts of negative feedback to provide stable operational characteristics. Each Mix-Amp has four input channels having a 6000 OHM impedance. The input channels normally operate at the following levels:

Channel 1	+10 DBM
Channel 2	-20 DBM
Channel 3	+ 6 DBM
Channel 4	-48 DBM

Channels 1, 2 and 3 contain balanced H-pad attenuators which reduce all channel levels to -48 DBM at the primary of each channel input transformer. The four signal channels are combined in an isolation-mixer resistance network and applied to the two stage integrated circuit amplifier. The amplifier output is 10 DBM (10 milliwatts) across a 600 OHM load impedance.

2. CIRCUIT ANALYSIS.

2.1 Power Supply. (See figure 9-2). Primary voltage is applied to power transformer T1 through power ON-OFF switch S1 and fuse F1. The transformer secondary provides 32 volts AC centertapped to the rectifier circuits. Silicon diodes CR3 and CR4, Type JAN IN4245 provide full wave rectification of the positive output voltage. Diode CR1 and CR2, also Type JAN IN4245 provide full wave rectification of the negative output voltage. Resistors R1 and R2, 4.7 OHMS, provide surge protection for the diode rectifiers. Filter capacitors C1 and C2 together with resistor R3 provide filtering of the positive DC voltage. Zenner diode CR5 Type JAN IN2976B regulates the positive output at 12 volts DC. Filter capacitors C1 and C3 together with resistor R4 filters the negative DC output voltage. Zenner diode CR6, Type JAN IN2976RB regulates the negative output at 12 volts DC.

2.2 Mix-Amp. (See figure 9-1). The operation of only one Mix-Amp will be described here, since each of the eight Mixing Amplifiers are identical. The four inputs as described in paragraph 1-3 are connected through plug P1 to their respective attenuator H-Pads, which have a 6000 OHM input and output impedance. The H-Pads are placed in the input circuit to normalize all signal levels to -48 DBM. These signals are coupled to the input transformers T1, T2, T3 and T4 which have 6000 OHM primaries and 500 OHM secondaries. From the input transformers the signals are applied across the output level controls R16, R17, R18 and R19. The signals from the output level controls are then mixed and isolated from each other by resistors R20, R21, R22 and R23 and applied to the input of the first amplifier stage AR1. Amplifier AR1 is an integrated circuit operational amplifier Type UA709T which employs a large amount of negative feedback. Capacitor C1 provides input compensation and capacitor C3 provides output compensation for the IC amplifier. Resistor R26 provides isolation for first stage output. Negative feedback for the amplifier stage is supplied to the inverting input pin 2 by the resistor-capacitor network R24, R25 and C2. The output of the first amplifier stage is applied to a simple T section filter consisting of L1, L2 and C4 which is terminated in load resistor R27. This filter provides a 10 DB roll-off in frequency response of the amplifier between 3000 and 6000 HZ. The signal is then coupled to the second integrated circuit amplifier stage AR2 by coupling capacitor C5 and input load resistor R28. The operation of this integrated circuit operational amplifier stage (Type HA709T) is similar to that described for the first stage. Capacitors C8 and C7 provide input and output compensation respectively. Resistor R31 is the output load isolation resistor. Resistor-capacitor network R29, R30 and C6 provides the negative feedback for stabilization of the amplifier stage. The output signal is applied to the output transformer T5 which has a 500 OHM primary and 600 OHM secondary impedance. The Mix-Amp integrated circuits operate from the positive and negative 12 volt DC voltages provided by the Power Supply.

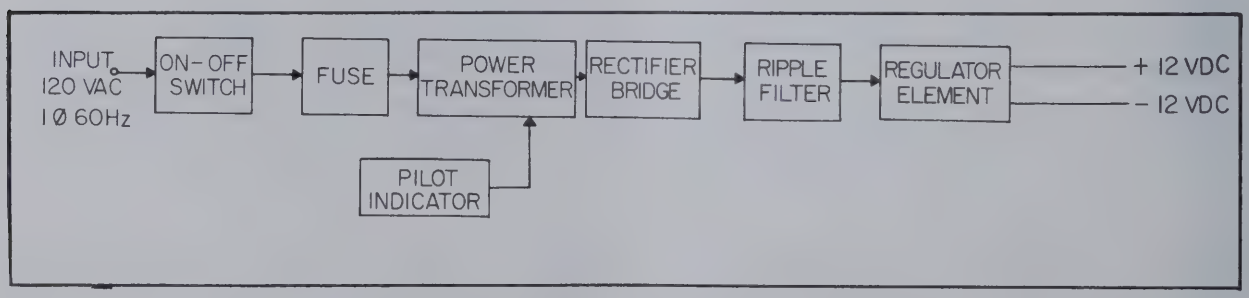

Figure 2-1. Power Supply Block Diagram

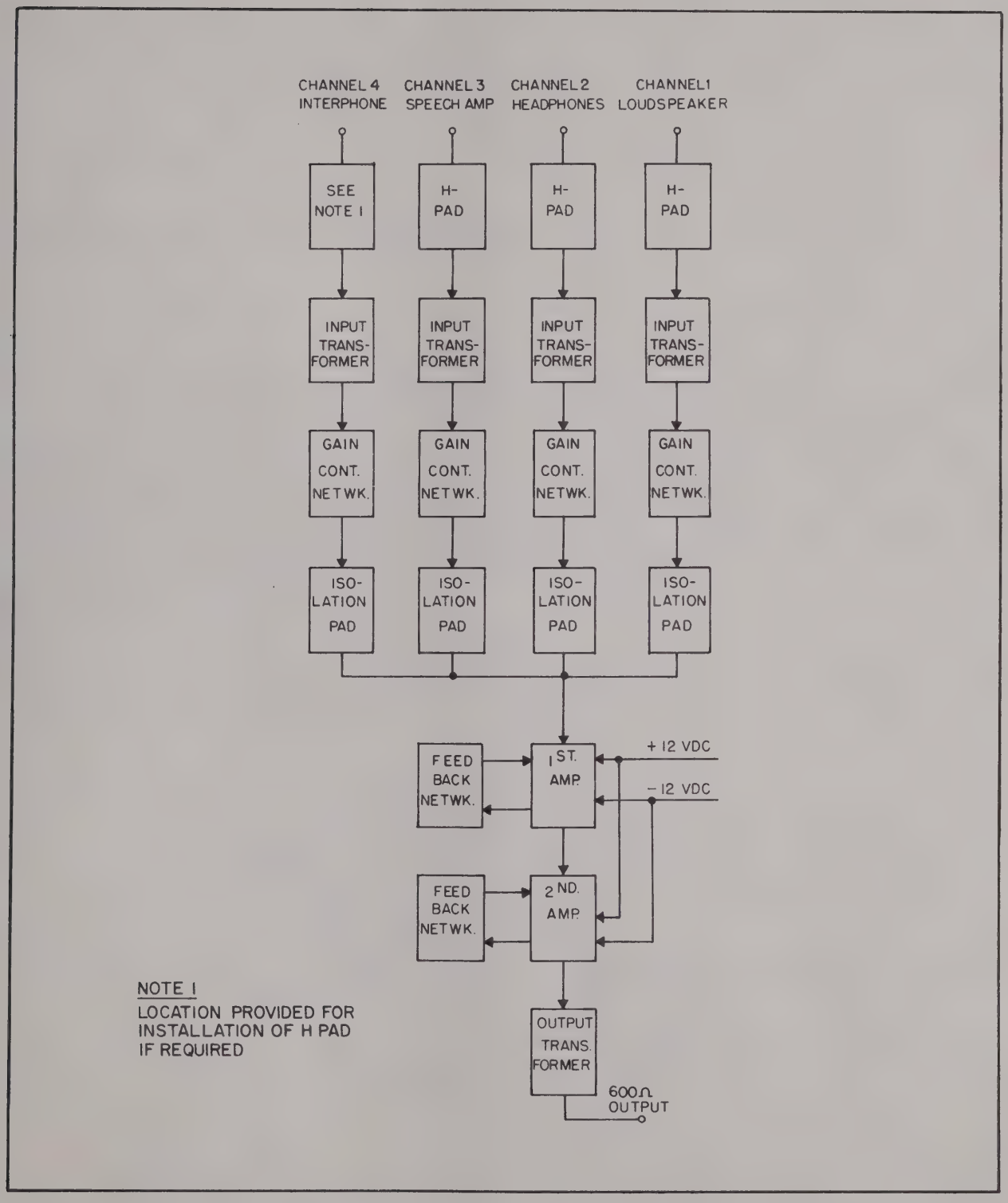

Figure 2-2. Amplifier Block Diagram

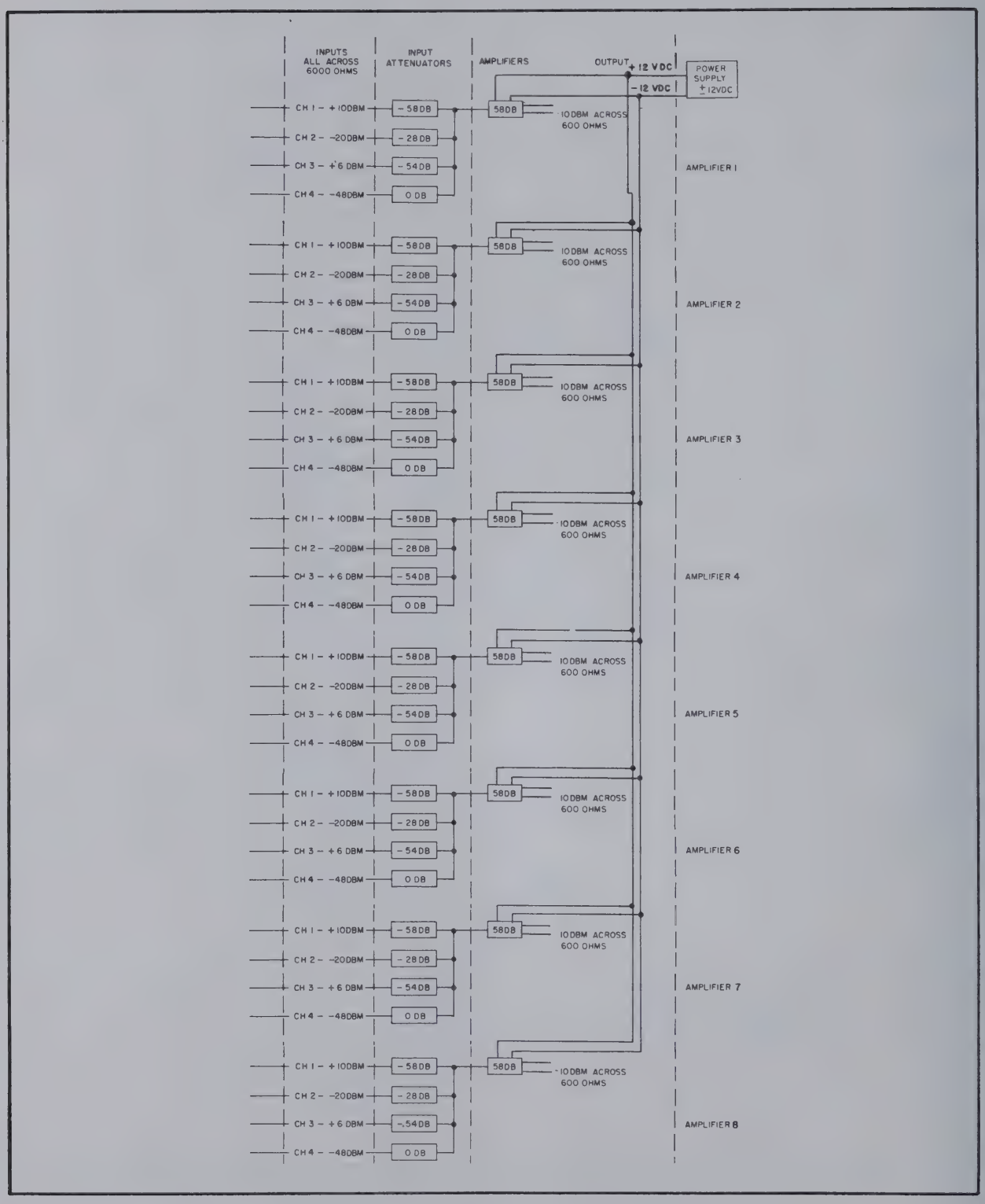

Figure 2-3. Mixing Amplifier Assembly, Functional Diagram

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1. INTRODUCTION.

1.1 This section includes the instructions for the installation, electrical power connection, input and output signal connections, and initial alignment procedures.

2. INSTALLATION.

2.1 General. The Mix-Amp Assembly was designed for installation in the standard 19 inch equipment rack. The Mix-Amp Assembly should be installed within practicable distance of the cables that supply the input signals and the cables that feed the output signal to the desired equipment. Although the Mix-Amp Assembly does not generate enough heat to damage equipment, the equipment should not be installed near a source of heat or humidity that could effect it. Recommended temperature limits are +10 degrees C to 50 degrees C., recommended relative humidity limits are 10% to 80%. Excessive heat and humidity can adversely effect both the life and the operation of solid state equipment.

3. ELECTRICAL POWER CONNECTION.

3.1 General. The Mix-Amp Assembly includes a two-foot AC power cord for plugging into a 120 VAC, 60 Hertz, single phase source. Input AC power required for the Mix-Amp Assembly is 15 watts.

SAFETY FIRST

> The AC Power Cord should be unplugged from the 120 VAC source or the switch on the power supply should be in the OFF position whenever a module is removed, whenever cabling is changed, or whenever test equipment is connected to the Mix-Amp Assembly.

3.2 Input and Output Signal Connections. (See figure 9-3 and photo 8-2). The connectors for input and output signals for the Mix-Amp Assembly are located on the rear of the Mix-Amp Assembly. Signal connectors are blue-ribbon male.

3.3 Initial Alignment Procedure. The Mix-Amp Assembly has been completely aligned at the factory and requires no initial alignment.

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SECTION 4. OPERATION

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1. INTRODUCTION.

1.1 General. This section includes diagrams of controls, test points, indicators, connectors on the front and rear panels, and the step-by-step operation procedures.

2. CONTROLS, TEST POINTS, INDICATORS, AND CONNECTORS.

2.1 Mix-Amp. The controls and test points for the Mix-Amp are located on the front panel. There is a test point and output level control for each channel of the Mix-Amp. In addition, a ground or common connection for the Mix-Amp and a test point for the output signal are located on the front panel. The controls and test points for the Mix-Amp are illustrated in figure 4-1.

2.2 Power Supply. The controls, indicators, and test points for the Power Supply are located on the front panel. These are identified in figure 4-2. Included on the Power Supply front panel are a 3/8 amp delayed action fuse, the switch that controls AC power to the Power Supply (and therefore the Mix-Amp Assembly), an indicating lamp that lights with the application of AC power, and test points for the DC output of the Power Supply.

1 LS (Loud Speaker) Test Point TP1-Provides front panel access to Channel 1 input signal.

2 LS (Loud Speaker) Control Potentiometer R22-Permits front panel adjustment of Channel 1 output level.

3 GND Test Point-Provides front panel common or ground connection for the Mix-Amp.

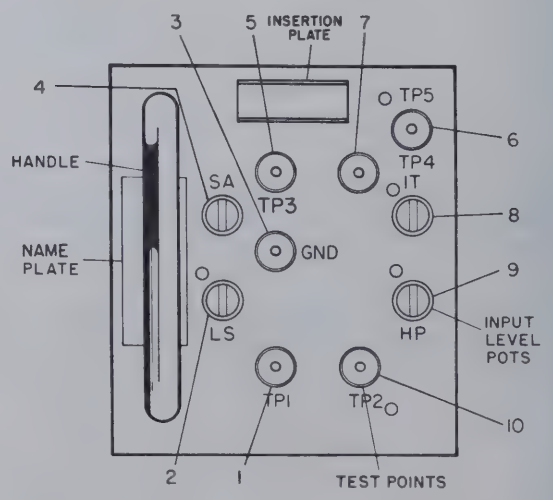
4 SA (Speech Amplifier) Control Potentiometer R30-Permits front panel adjustment of Channel 3 output level.

5 SA (Speech Amplifier) Test Point TP3-Provides front panel access to Channel 3 input signal.

6 OP (Output) Test Point TP5-Provides front panel access to Mix-Amp output signal.

7 IT (InTerphone) Test Point TP4-Provides front panel access to Channel 4 input signal.

8 IT (InTerphone) Control Potentiometer R34-Permits front panel adjustment of Channel 4 output level.



9 HP (Head Phones) Control Potentiometer R26-Permits front panel adjustment of Channel 2 output level.

10 HP (Head Phones) Test Point TP2-Provides front panel access to Channel 2 input signal.

Figure 1. Mix-Amp Front Panel Control and Test Points

3. STEP-BY-STEP OPERATION.

3.1 General. After the Mix-Amp Assembly has been placed in operation, with the exception of output level adjustments and noise checks on occasion, equipment adjustments are not necessary.

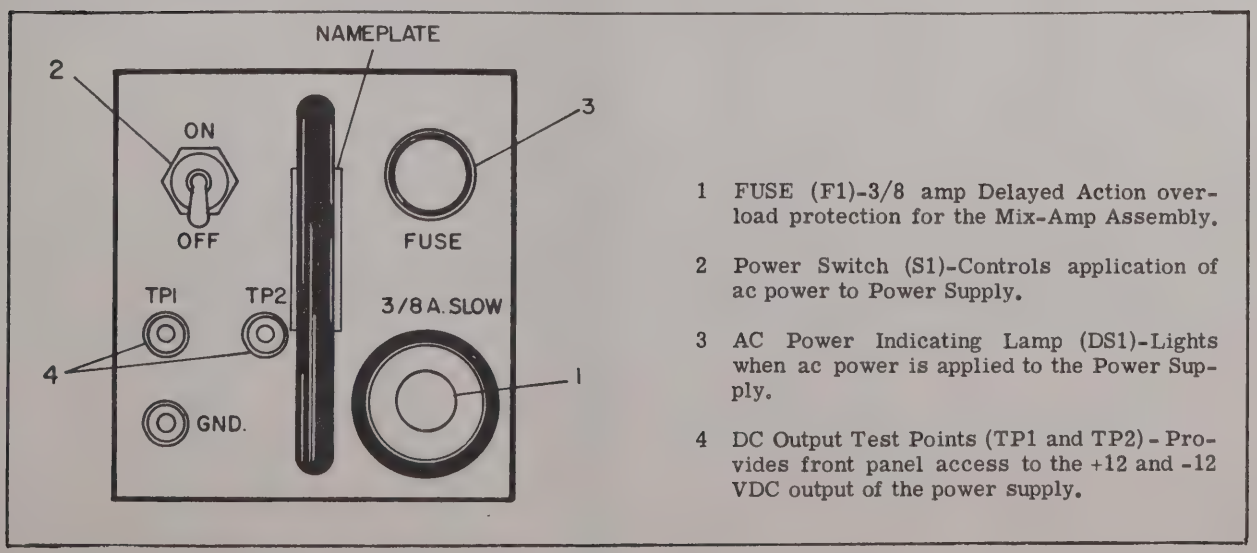
3.2 Adjustments. Each channel should be adjusted for 10 DBM output at 1000 hertz across a 600 OHM load.

3.3 Operation. To place the Mix-Amp Assembly into operation, proceed as follows:

1. Place the AC Power Switch on the Power Supply in the OFF position.
2. Install the Mix-Amp Assembly in accordance with the installation procedures in Section 3.
3. Make the desired input and output signal connections to the rear panel of the Mix-Amp Assembly.
4. Adjust the associated auxiliary equipment for the desired signals and signal levels.
5. Plug in the AC power cable at the rear of the Mix-Amp Assembly into the proper source: 120 VAC, 60 hertz, single phase.
6. Place the AC Power Switch on the Power Supply in the ON position.
7. Readjust as desired, the associated auxiliary equipment.

SAFETY FIRST

Do not remove any of the modules or cables from the Mix-Amp Assembly until after the AC power switch on the Power Supply has been placed in the OFF position or the AC Power Cable from the Mix-Amp Assembly has been unplugged from the AC source.



1 FUSE (F1)-3/8 amp Delayed Action overload protection for the Mix-Amp Assembly.

2 Power Switch (S1)-Controls application of ac power to Power Supply.

3 AC Power Indicating Lamp (DS1)-Lights when ac power is applied to the Power Supply.

4 DC Output Test Points (TP1 and TP2)-Provides front panel access to the +12 and -12 VDC output of the power supply.

Figure 2. Power Supply Front Panel Control, Indicators, and Test Points

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SECTION 5. PREVENTIVE MAINTENANCE

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1. SCHEDULES.

1.1 Schedules shall be set-up and maintained by the using activity.

2. CLEANING AND INSPECTION.

2.1 Connections, cables and components should be periodically inspected for evidence of wear and deterioration. Dirt and dust should be removed to prevent interference with the radiation of heat.

3. NOISE CHECKS.

3.1 Noise checks and output level measurements should be made periodically and the Mix-Amp Assembly adjusted accordingly.

SECTION 6. CORRECTIVE MAINTENANCE

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1. SEMICONDUCTOR DEVICES/INTEGRATED CIRCUITS-PRECAUTIONS.

1.1 General precautions applicable to semiconductor devices and integrated circuits are as follows:

Semiconductor devices/integrated circuits can be damaged by transients, capacitive leakage currents, resistive leakage currents, and static discharges, which would have no permanent effect on electron tubes. Hence body static must be discharged, and external grounds and AC lines must be disconnected to eliminate ground-return paths, before touching semi-conductor device/integrated circuit terminals with hand tools, or especially with soldering guns or irons (element windings have high capacitance to ground).

To avoid transients, never unsolder integrated circuits, transistors, diodes, or other semiconductor devices, nor remove them from plug-in mountings, without first de-energizing sources of element voltages.

Installation with reversed leads also polarity reversal of supply voltages, usually results in serious degration or failure.

Do not test any integrated or microelectronic circuit device without carefully observing input/output limitations and other applicable precautions. The minute semiconductor junctions are easily damaged, making it necessary to discard the entire device.

Before attempting to use ohmmeters for circuit tracing where semiconductor devices/integrated circuits (especially transistors) are involved, or for semiconductor device/intedgrated circuit testing, take the following precautions:

Beware of destructive high currents often present on low-ohm ranges.

Beware of voltages on high-ohm ranges which may be in excess of rated breakdown voltages of transistors, diodes, etc.

Determine ohmmeter internal battery polarity present on the test leads (usually the reverse of the marked polarity, which applies only to the voltage or current ranges of multimeters).

Heat sinks are often at above-chassis-ground potential, hence precautions should be taken to avoid shock and possible short-circuits. Do not introduce obstructions to air flow in the vicinity of heat sinks; loss of cooling capacity can result in overheating with resultant failure of semiconductor devices mounted on the heat sink.

2. SERVICE INSTRUCTIONS.

2.1 General. In servicing the Mixing Amplifier Assembly it is necessary that the technician be thoroughly familiar with the theory of operation of the equipment. When performing operational tests it is assumed that the Mixing Amplifier Assembly has been connected to a 120 volt AC source and that the proper input signal voltage has been applied to the Mix-Amp channel being tested.

2.2 Input Signal. (Normally 1000 HZ).

Channel 1 (LS) +10 DBM (7.75 VAC)
Channel 2 (HP) -20 DBM (0.245 VAC)
Channel 3 (SA) + 6 DBM (4.90 VAC)
Channel 4 (IT) -48 DBM (0.00975 VAC)

(Input impedance of each channel is 6000 OHMS)

SAFETY FIRST

The power ON-OFF switch on the Power Supply Module must be set to the "OFF" position when inserting or removing any Mix-Amp of the Power Supply Module.

3. TEST EQUIPMENT.

3.1 Extender Board. The Extender Board Assembly, not furnished with the Mixing Amplifier Assembly, facilitates the servicing of either a Mix-Amp or the Power Supply Module. To test a module, remove the Mix-Amp or Power Supply Module to be tested from the Main Chassis. Slide the unit to be tested into the Extender Board. Push the unit and Extender Board into the Main Chassis.

3.2 Test Equipment List.

Audio Oscillator. Hewlett-Packard Model 201C or equivalent.

AC Electronic Voltmeter, Hewlett-Packard Model 400E or equivalent.

DC Voltmeter (20,000 OHMS per Volt). Simpson Model 260 or equivalent.

Distortion Analyzer. Hewlett-Packard Model 331A or equivalent.

4. TROUBLESHOOTING

4.1 General. When equipment malfunction occurs, refer to the Troubleshooting Table 6-1 as an aid in analyzing the cause of the faulty operation.

4.2 Voltage Checks. The Voltage Check, Table 6-2 shows nominal operating voltages at the front panel test jacks and those associated with the integrated circuit amplifiers located on the printed circuit board. Refer to the schematic diagrams for further circuit tracing information.

TABLE 6-1. Troubleshooting

Symptom	Probable Cause	Check and Remedy
1. Power indicator lamp not lit with power switch in ON position	1.a. No primary power.	1.a. Check power source and connection to equipment.
	b. Line fuse (F1)blown.	b. If fuse indicator light is ON, replace fuse.
	c. Defective power switch (S1).	c. Replace switch.
	d. Indicator lamp (DS1) burned out.	d. Replace lamp.
2. No output from any channel of any Mixing Amplifier.	2.a. No +12VDC and -12VDC from Power Supply Module,	2.a. Check voltage at test jacks of Power Supply Module and replace defective components.
3. No output from any channel of one Mixing Amplifier	3.a. No DC voltage to Mixing Amplifier.	3.a. Check for +12VDC and -12VDC on Printed circuit board.
	b. Integrated circuit amplifier (AR1) defective.	b. Replace AR1.
	c. Integrated circuit amplifier (AR2) defective.	c. Replace AR2.
	d. Output Transformer (T5) defective.	d. Replace transformer T5.

TABLE 6-1. Troubleshooting Cont.

4. No output from channel 1 of Mixing Amplifier.	4.a. Defective "H-Pad" resistor. (R1,R2,R3,R4,R5).	4.a. Check resistors and replace defective components.
	b. Input transformer (T1) defective.	b. Replace transformer.
	c. Potentiometer (R16) defective.	c. Replace potentiometer.
5. No output from Channel 2 of Mixing Amplifier.	5.a. Defective "H-Pad" resistor. (R6,R7,R8,R9,R10)	5.a. Check resistors and replace defective components.
	b. Input transformer (T2) defective.	b. Replace transformer.
	c. Potentiometer (R17) defective.	c. Replace potentiometer.
6. No output from Channel 3 of Mixing Amplifier.	6.a. Defective "H-Pad" resistor. (R11,R12,R13,R14,R15)	6.a. Check resistors and replace defective components.
	b. Input transformer (T3) defective.	b. Replace transformer.
	c. Potentiometer (R18) defective.	c. Replace potentiometer.
7. No output from Channel 4 of Mixing Amplifier.	7.a. Input transformer (T4) defective.	7.a. Replace transformer.
	b. Potentiometer (R19) defective.	b. Replace potentiometer.

TABLE 6-2. Voltage Check

Integrated Circuit	PIN NUMBER							TEST JACK	
1	2	3	4	5	6	7	8	TP1 (LS)	TP5 (OP)
AR1 (N5709T) ---	0.00035	0.00036	-12VDC	---	0.053	+12VDC	---	0.0014	2.8
AR2 (N5709T) ---	---	---	-12VDC	---	---	+12VDC	---	---	---

CONDITIONS:

1. A 10 DBM (7.75 VAC), 1000 Hz signal applied to Channel 1 input. (No input signal to other channels).

2. Gain Control (LS) adjusted for 10 DBM (2.45 VAC) amplifier output across 600 OHM load.

3. All AC voltages, RMS unless otherwise indicated.

4. All measurements made with respect to ground.

5. All AC measurements made with Electronic Voltimeter, Hewlett-Packard Model 400E or equivalent.

6. DC measurements made with a 20,000 OHM per volt voltmeter.

7. Integrated Circuit (N5709T) basing diagram indicated in figure 6-1.

NOTE

Test jacks TP2 (HP), TP3 (SA) and TP4 (1T) provide test points for measuring the input signal to the mixing amplifier supplied by channels 2, 3, and 4 respectively. When the input signal is supplied by any channel (one at a time), the signal voltage appearing at the respective input signal test jack should be the same as indicated above for TP1 when the channel gain control is adjusted for 10 DBM amplifier output.

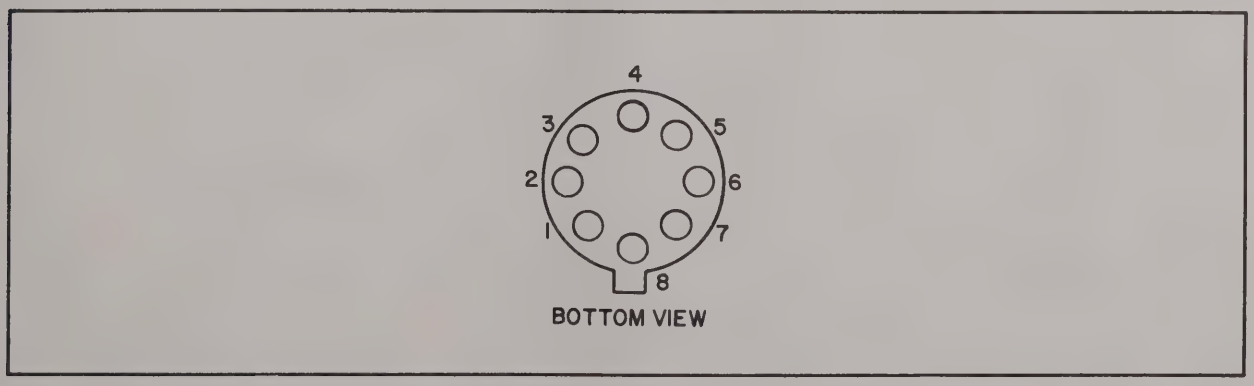


Figure 6-1. Integrated Circuit Base Diagram

MODEL MAA-8/600
AUDIO MIXING AMPLIFIER ASSEMBLY

SECTION 7 PARTS LIST

Ref. Desig.	Name of Part and Description	Manuf. Code	Manufacturer's Part No.	Jan or Mil Desig.	All Ref. Des. Involved
	Amplifier Assembly, Audio Mixing MAA-8/600	21870	LM-14360	—	—
	Amplifier Module, Audio Mixing MA-8/600	21870	LM-14332	—	—
	Board Assy, Printed Circuit	21870	LM-14331	—	—
AR1, AR2	Circuit, Integrated	18324	μA709T	—	AR1, AR2
C1	Capacitor, Mica, 100 PF ±5%, 500 VDC	—	—	CM05FD101J03	C1, C8
C2	Capacitor, Mica, 270 PF ±5%, 500 VDC	—	—	CM05FD271J03	C2
C3	Capacitor, Mica, 180 PF ±5%, 500 VDC	—	—	CM05FD181J03	C3, C7
C4	Capacitor, Mylar 0.068UF, ±10%, 50 VDC	84411	601-PE	—	C4
C5	Capacitor, Mylar, 0.22UF, ±10%, 50 VDC	84411	601-PE	—	C5
C6	Capacitor, Mica, 390PF ±5%, 500 VDC	—	—	CM05FD391J03	C6
C7	Same as C3				
C8	Same as C1				
L1, L2	Choke, AF, 47 MHY ±10%	—	—	MS90537-69	L1, L2
P1	Printed Circuit Board	21870	C14430	—	P1
R1, R2 R3, R4	Resistor, Comp., 3K Ohms ±5% ¼ W.	—	—	RC07GF302J	R1, R2, R3, R4, R11, R12, R13, R14
R5	Resistor, Comp., 15 Ohms ±5% ¼ W.	—	—	RC07GF150J	R5

Ref Desig.	Name of Part and Description	Manuf. Code	Manufacturer's Part No.	Jan or Mil Desig.	All Ref. Des. Involved
R6, R7 R8, R9	Resistor, Comp., 2.7 K Ohms ±5% ¼ W	—	—	RC07GF272J	R6, R7, R8, R9
R10	Resistor, Comp., 470 Ohms ±5% ¼ W	—	—	RC07GF471J	R10
R11,R12 R13,R14	Same as R1				
R15	Resistor, Comp., 24 Ohms ±5% ¼ W	—	—	RC07GF240J	R15
R16,R17 R18,R19	Potentiometer, Comp., ¼ W. 500 Ohms	—	—	RV6NAYSL501C	R16, R17, R18, R19
R20,R21 R22,R23	Resistor, Comp., 15K Ohms ±5% ¼ W	—	—	RC07GF153J	R20, R21, R22, R23
R24	Resistor, Comp., 1000 Ohms ±5% ¼ W	—	—	RC07GF102J	R24, R27, R29
R25	Resistor, Comp., 100K Ohms ±5% ¼ W	—	—	RC07GF104J	R25
R26	Resistor, Comp., 51 Ohms ±5% ¼ W	—	—	RC07GF510J	R26, R31
R27	Same as R24				
R28	Resistor, Comp., 10K Ohms ±5% ¼ W	—	—	RC07GF103J	R28
R29	Same as R24				
R30	Same as R25				
R31	Same as R26				
T1,T2 T3,T4	Transformer, Audio Freq. Pri. 6000, Sec. 500 Ohms	89665	SAW-260	—	T1, T2, T3, T4
T5	Transformer, Audio, Freq. Pri. 500, Sec. 600 Ohms	89665	SAW-261	—	T5
TP1,TP2 TP3,TP4	Tip Jack (Color white)	98291	SKT-5BC	—	TP1, TP2, TP3, TP4,
TP5	Tip Jack (Color blue)	98291	SKT-5BC	—	TP5
TP6	Tip Jack (Color black)	98291	SKT-5BC	—	TP6

MODEL MAA-8/600
AUDIO MIXING AMPLIFIER ASSEMBLY

Ref. Desig.	Name of Part and Description	Manuf. Code	Manufacturer's Part No.	Jan or Mil Desig.	All Ref. Des. Involved
	Power Supply PS-120/8	21870	LM-14342	—	—
	Printed Circuit Board Assy (Connector Section)	21870	LM-14341	—	—
C2,C3	Capacitor, Electrolytic 75 MFD, 30 VDC	56289	39D756G030EE4	—	C2, C3
P1	Printed Circuit Board (with edge connector)	21870	C-14340	—	P1
	Printed Circuit Board Assy (Component Section)	21870	LM-14346	—	—
	Printed Circuit Board	21870	C-14345	—	—
C1	Capacitor, Electrolytic, 500 MFD, 50 VDC	56289	39D507G050GL4	—	C1
CR1,CR2 CR3,CR4	Diode, Silicon, Type IN4245	—	—	IN4245	CR1, CR2, CR3 CR4
R1,R2	Resistor, Comp., 4.7 Ohms ±10% 1 Watt	—	—	RC32GF4R7K	R1, R2
R3,R4	Resistor, Wirewound, 27 Ohms ±5% 11 Watt	—	—	RW68V270	R3, R4
R5	Resistor, Comp., 220 Ohms ±10% 1 Watt	—	—	RC32GF221K	R5
CR5,CR6	Diode, Voltage Regulator 12 V. Type 1N2976B	—	—	IN2976B	CR5, CR6
DS1	Lamp, Indicator 28 Volt	08806	#327	—	DS1
F1	Fuse, 3/8 Amp., Slow Blow	71400	MLD-3/8	—	F1

Ref. Desig.	Name of Part and Description	Manuf. Code	Manufacturer's Part No.	Jan or Mil Desig.	All Ref. Des. Involved
GND	Tip Jack, (Color black)	98291	SKT-5BC (Black)	—	GND
S1	Switch, Toggle, DPDT	—	—	MS25100-22	S1
T1	Transformer, Power, Stepdown	89665	PAW-187	—	T1
TP1	Tip Jack, (Color red)	98291	SKT-5BC (Red)	—	TP1
TP2	Tip Jack, (Color violet)	98291	SKT-5BC (Violet)	—	TP2
XDS1	Indicator Light Assy Green	72619	359-8430-09-502	—	XDS1
XF1	Fuse Holder	71400	HKL-90-250	—	XF1
	Extender Board Assy	21870	LM-14348	—	—

VENDOR'S CODES.

The following list identifies the manufacturer whose code appears in column 3 of the parts list.

CODE	VENDOR
08806	General Electric Company Miniature Lamp Dept., Nela Park Cleveland, Ohio 44112
18324	Signetics Corporation 811 East Argues Avenue Sunnyvale, Calif. 94086
21870	GRM Corporation Triangle Industrial Center Medford, New Jersey 08055
43543	Nytronics Inc., Transformer Co., Div. 3rd Avenue Alpha, New Jersey 08866
56289	Sprague Electric Company North Adams, Mass. 01247
71400	Bussman Mfg., Division of McGraw Edison Company, 2536 W. University Street St. Louis, Mo. 63017
72619	Dialight Corporation 60 Stewart Avenue Brooklyn, New York 11237
84411	TRW Capacitor Division 112 W. First Street Ogallala, Nebr.
89665	United Transformer Co. 150 Varick Street New York, N. Y. 10013
98291	Sealectro Corporation 225 Hoyt Mamaroneck, New York 10544

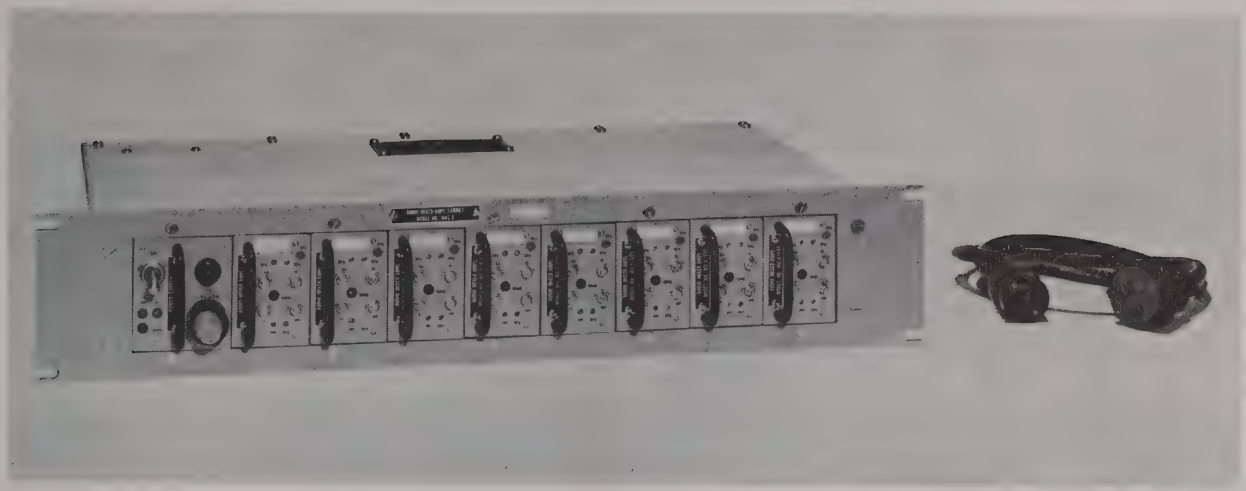


Fig. 8-1. Audio Mixing Amplifier Assembly, Front View

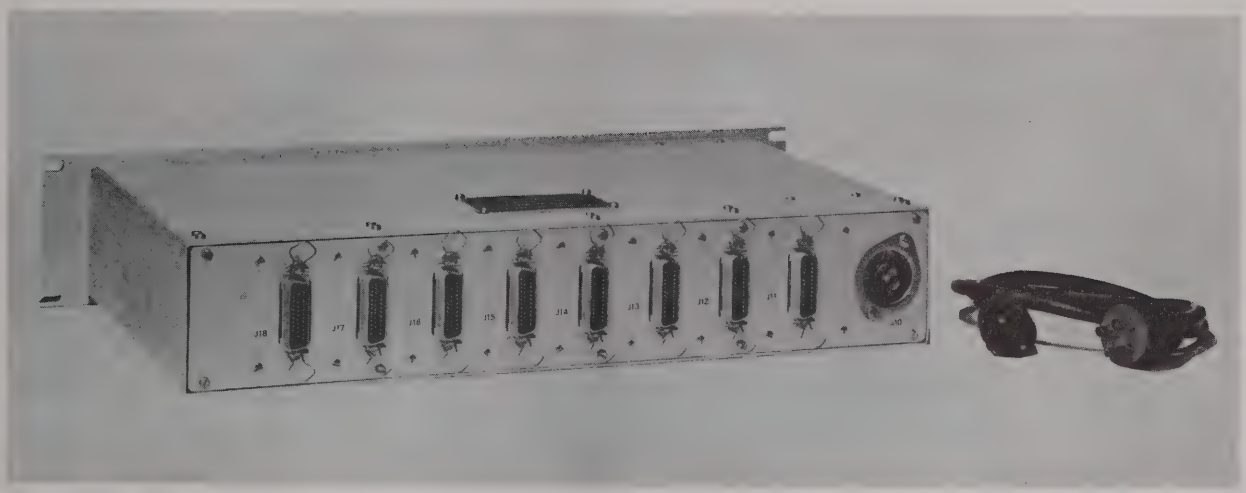


Fig. 8-2. Audio Mixing Amplifier Assembly, Rear View

Fig. 8-3. Power Supply Module, Front View

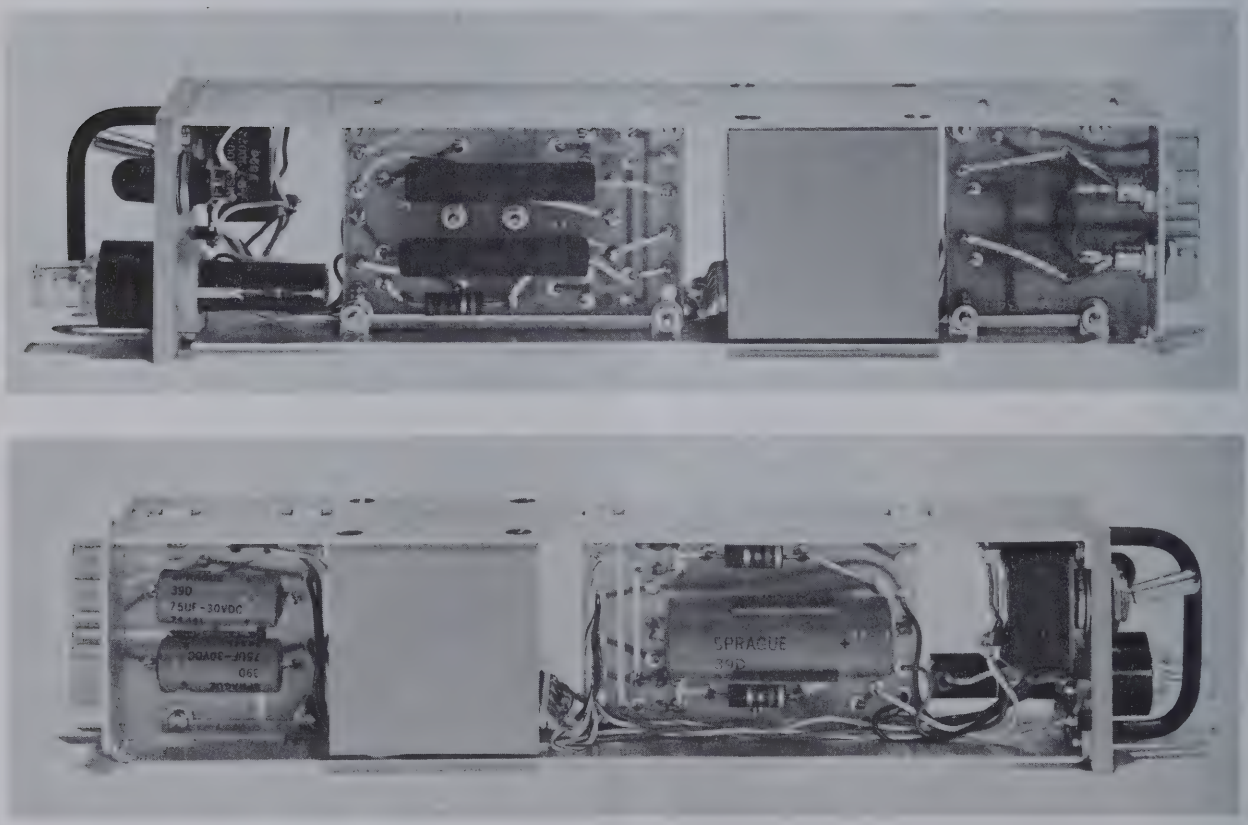


Fig. 8-4. Power Supply Module, Side Views

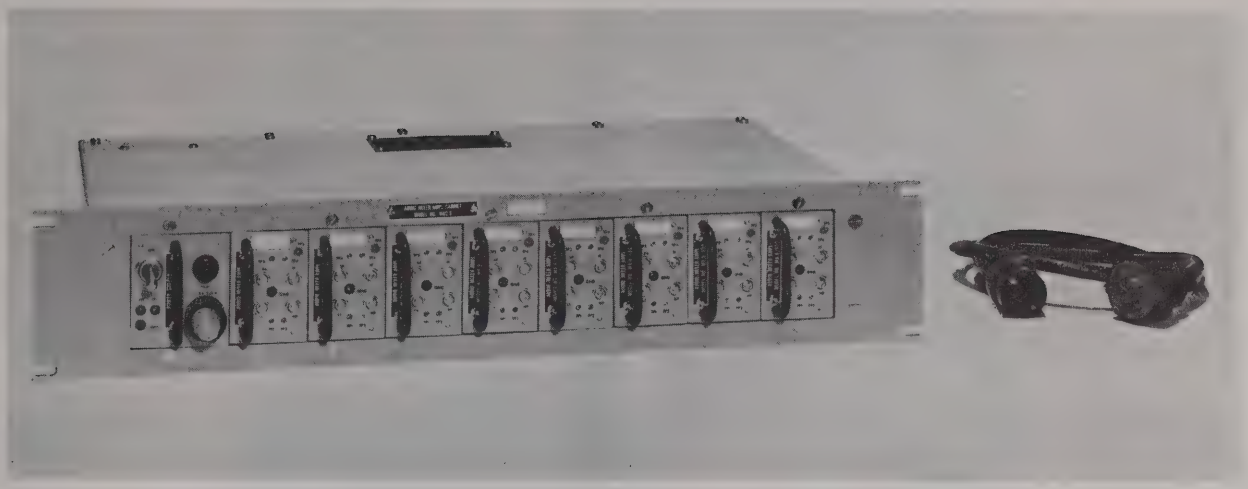


Fig. 8-1. Audio Mixing Amplifier Assembly, Front View

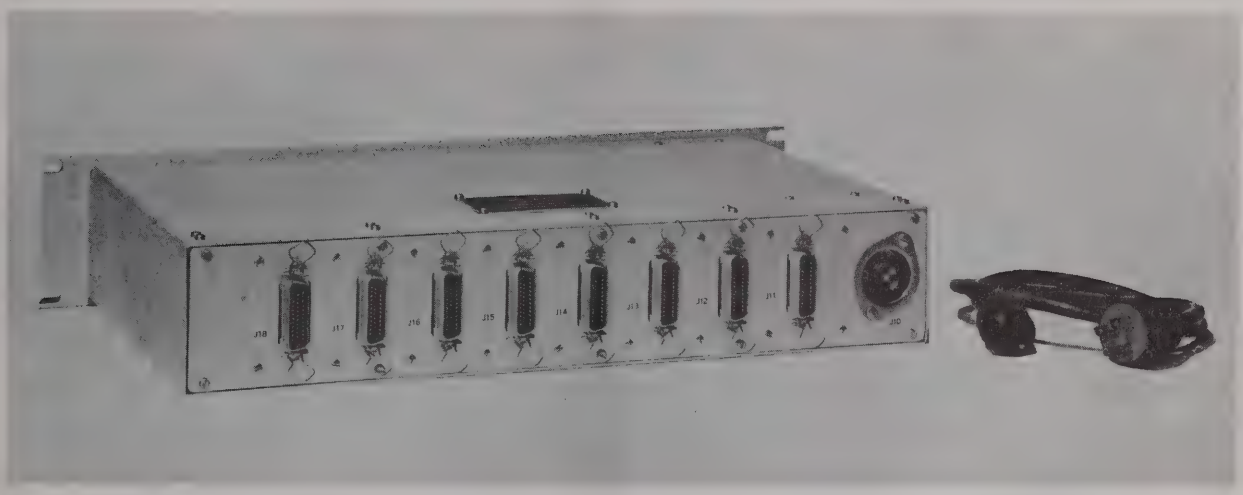


Fig. 8-2. Audio Mixing Amplifier Assembly, Rear View

Fig. 8-3. Power Supply Module, Front View

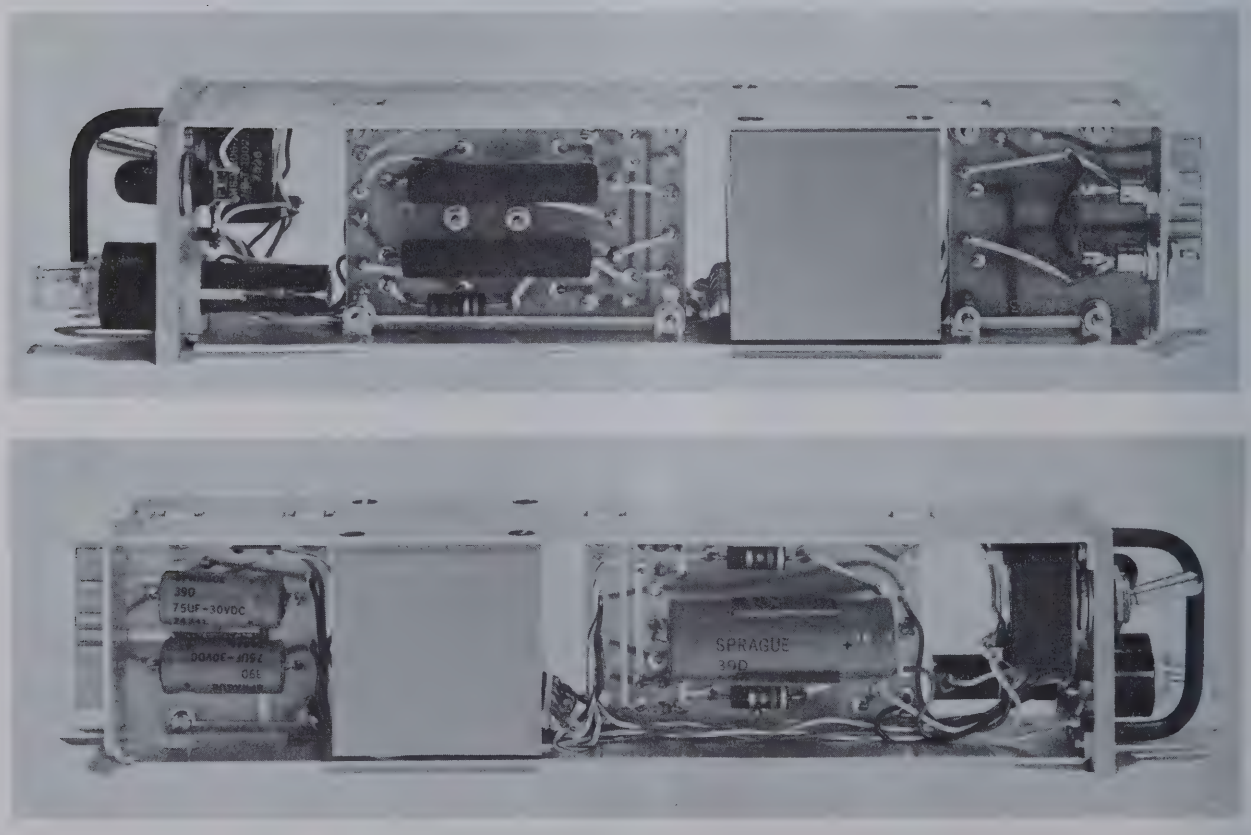


Fig. 8-4. Power Supply Module, Side Views

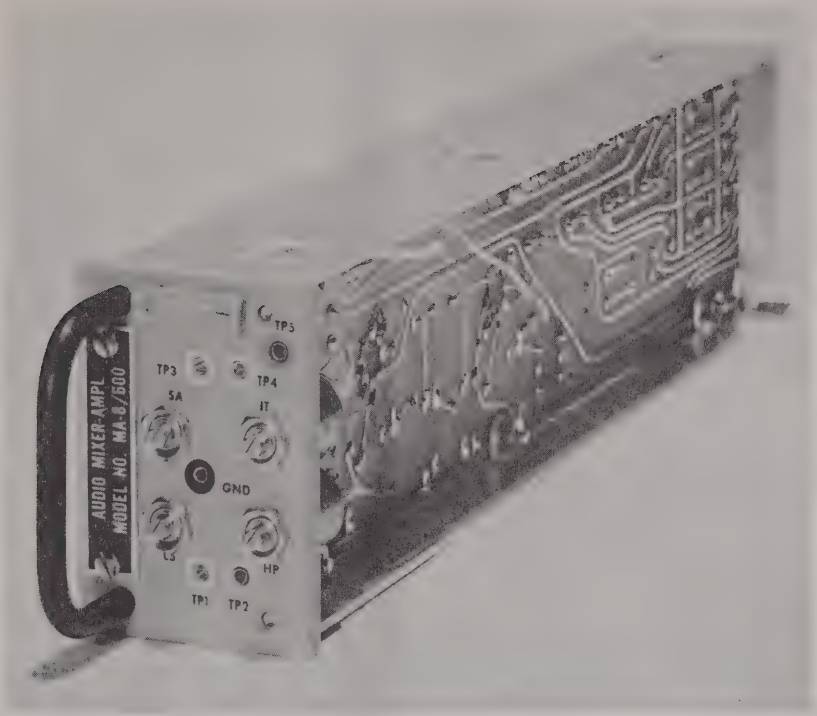


Fig. 8-5. Mixing Amplifier, Module, Front View

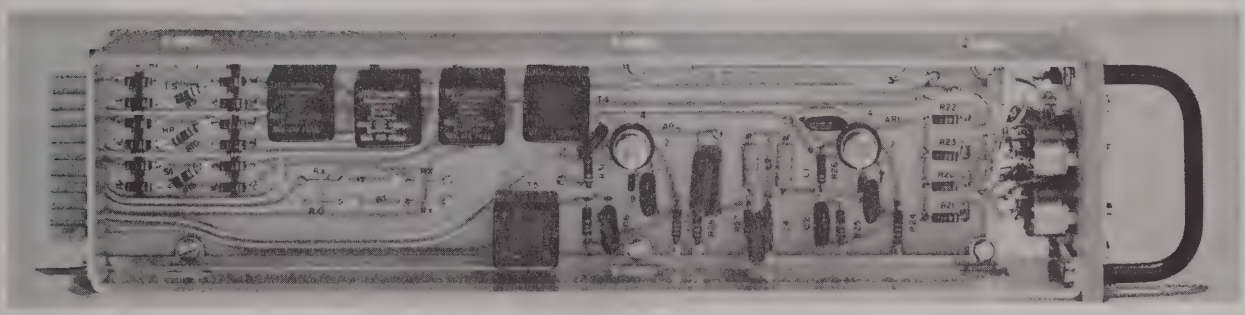


Fig. 8-6. Mixing Amplifier Module, Side View

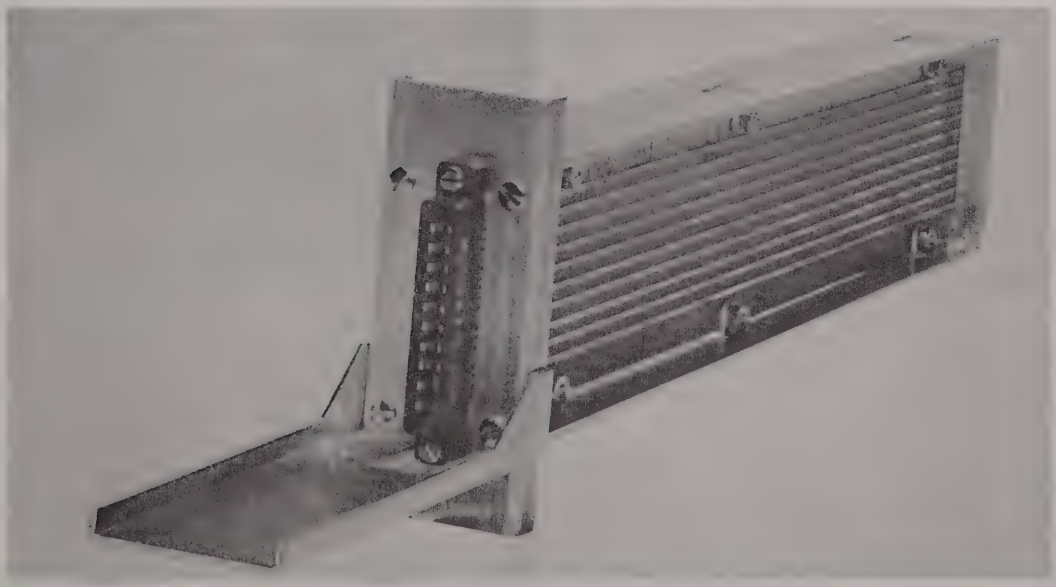


Fig. 8-7. Extender Board

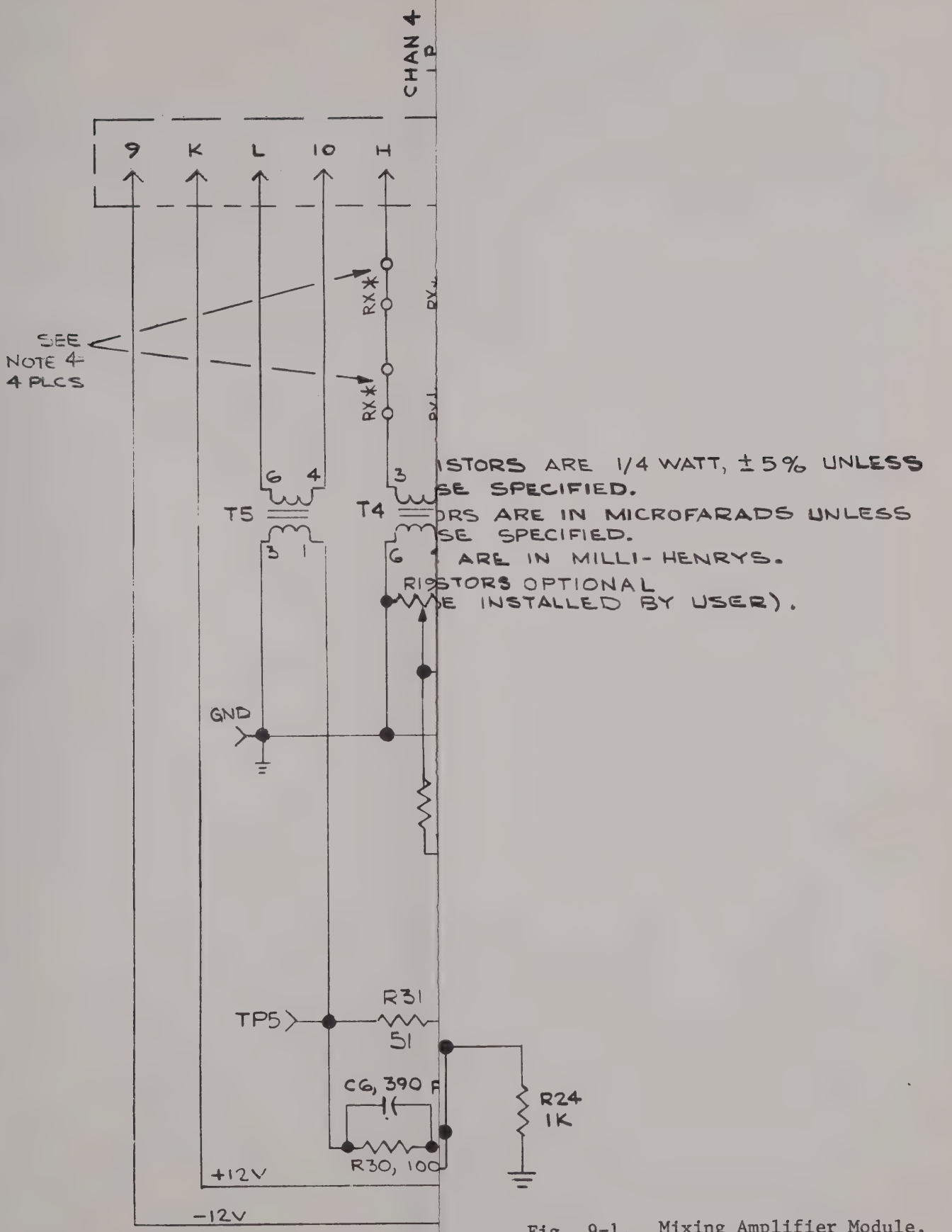
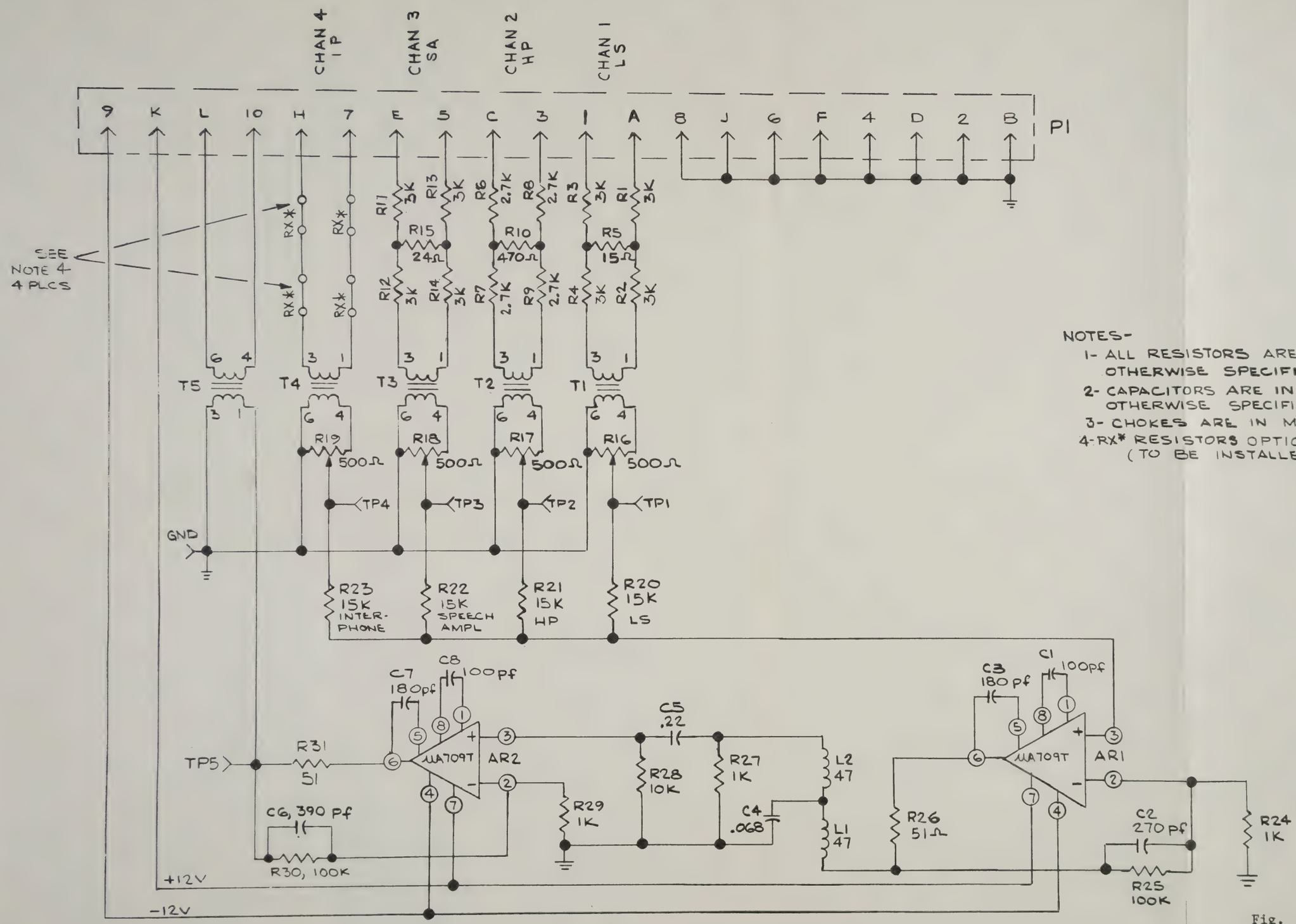


Fig. 9-1. Mixing Amplifier Module, MA-8/600, Schematic Diagram



NOTES-

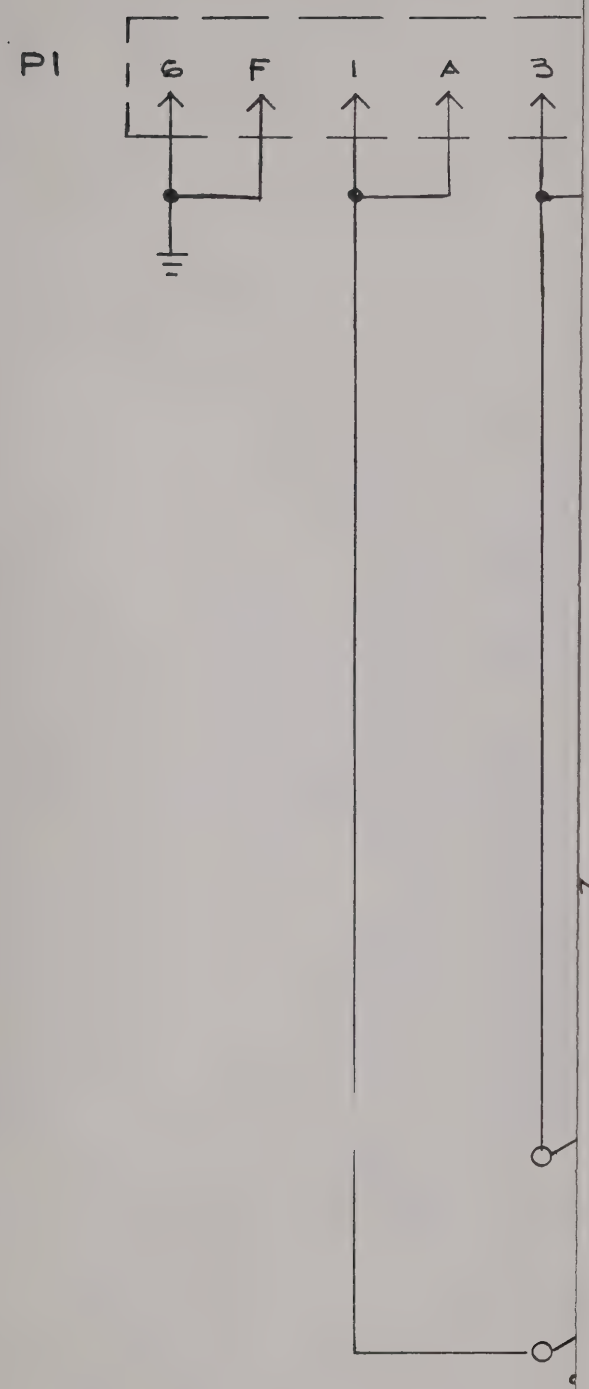
1- ALL RESISTORS ARE 1/4 WATT, ±5% UNLESS OTHERWISE SPECIFIED.

2- CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

3- CHOKES ARE IN MILLI-HENRYS.

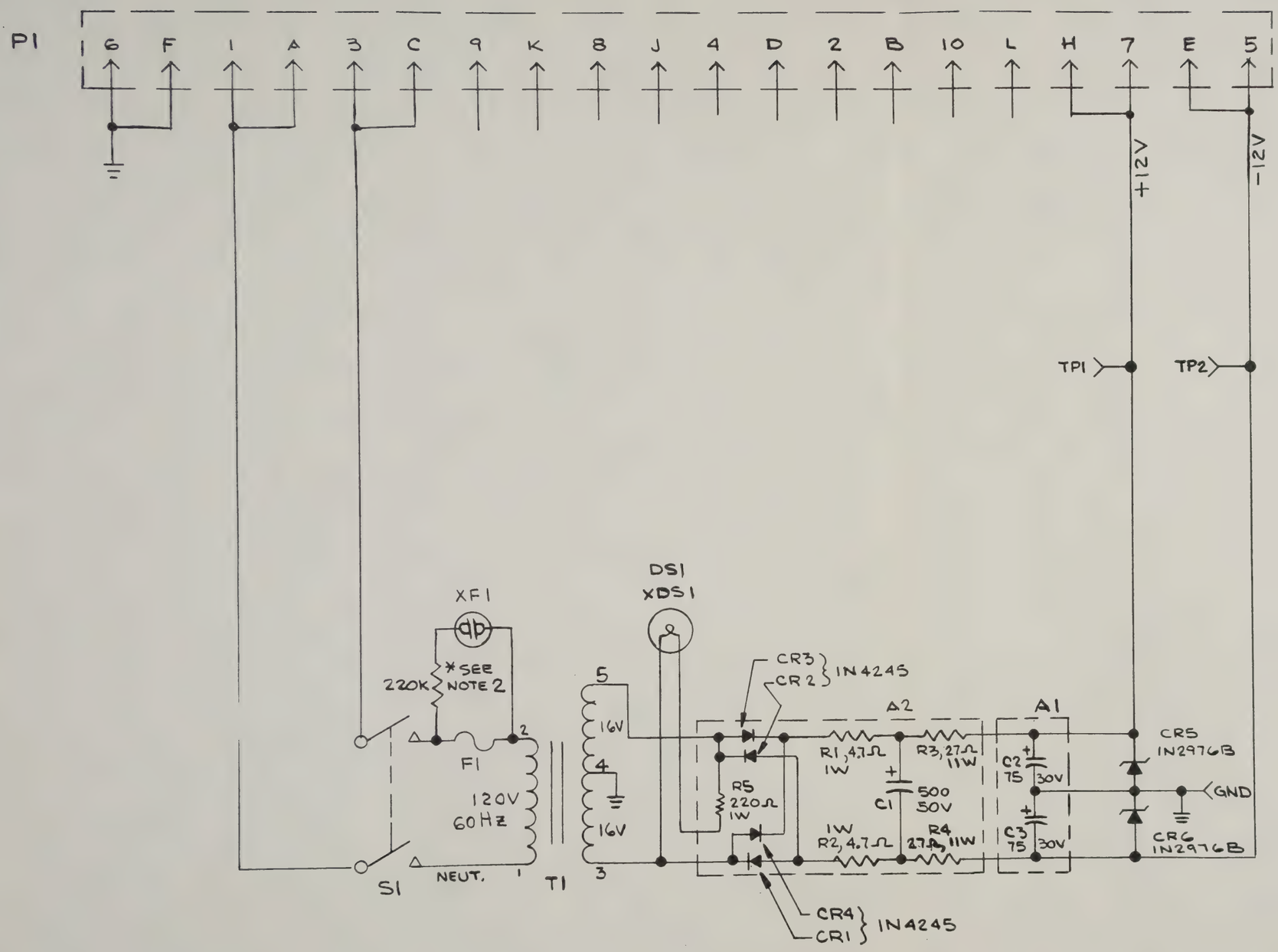
4-RX* RESISTORS OPTIONAL (TO BE INSTALLED BY USER).

Fig. 9-1. Mixing Amplifier Module, MA-8/600, Schematic Diagram



NOTES-
1- UNLESS OTHERWISE SPECIFIED ALL CAPACITORS ARE IN MICROFARADS.
2- RESISTOR SHOWN IS PART OF XF1.

Fig. 9-2. Power Supply, PS-120/8, Schematic Diagram



NOTES-

1- UNLESS OTHERWISE SPECIFIED ALL CAPACITORS ARE IN MICROFARADS.

2- RESISTOR SHOWN IS PART OF XF1.

Fig. 9-2. Power Supply, PS-120/8, Schematic Diagram

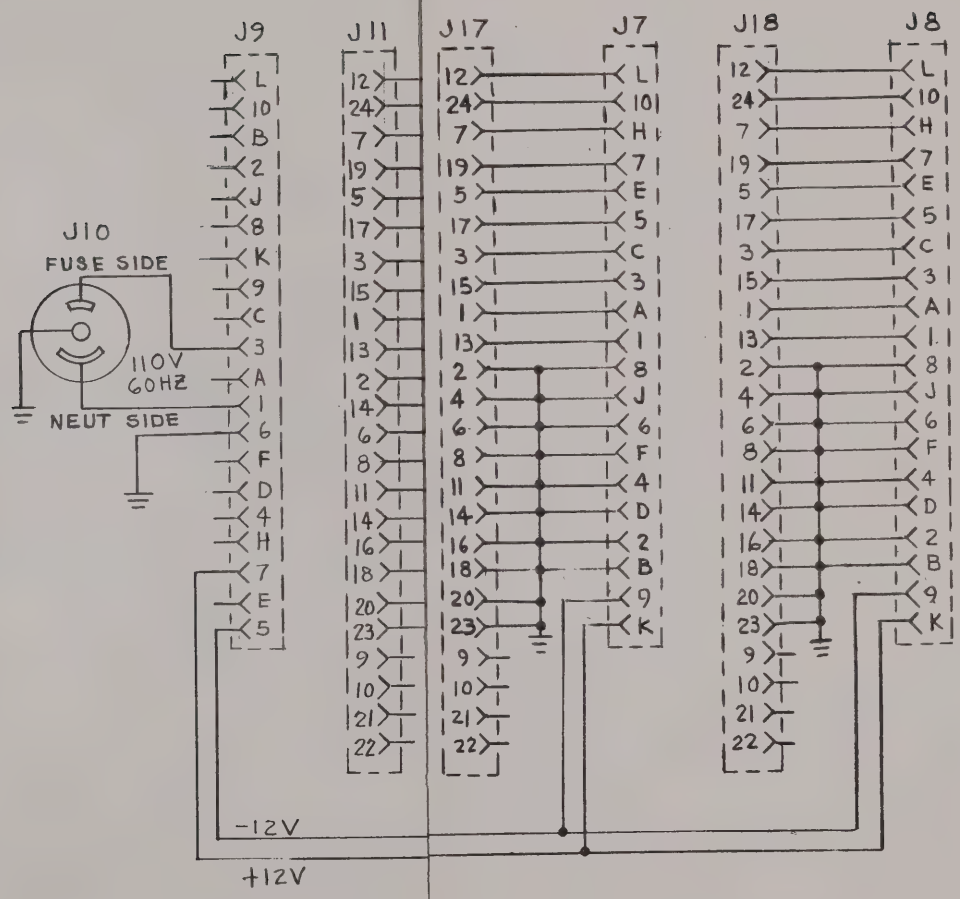


Fig. 9-3. Main Chassis, MAC-8/600
Schematic Diagram

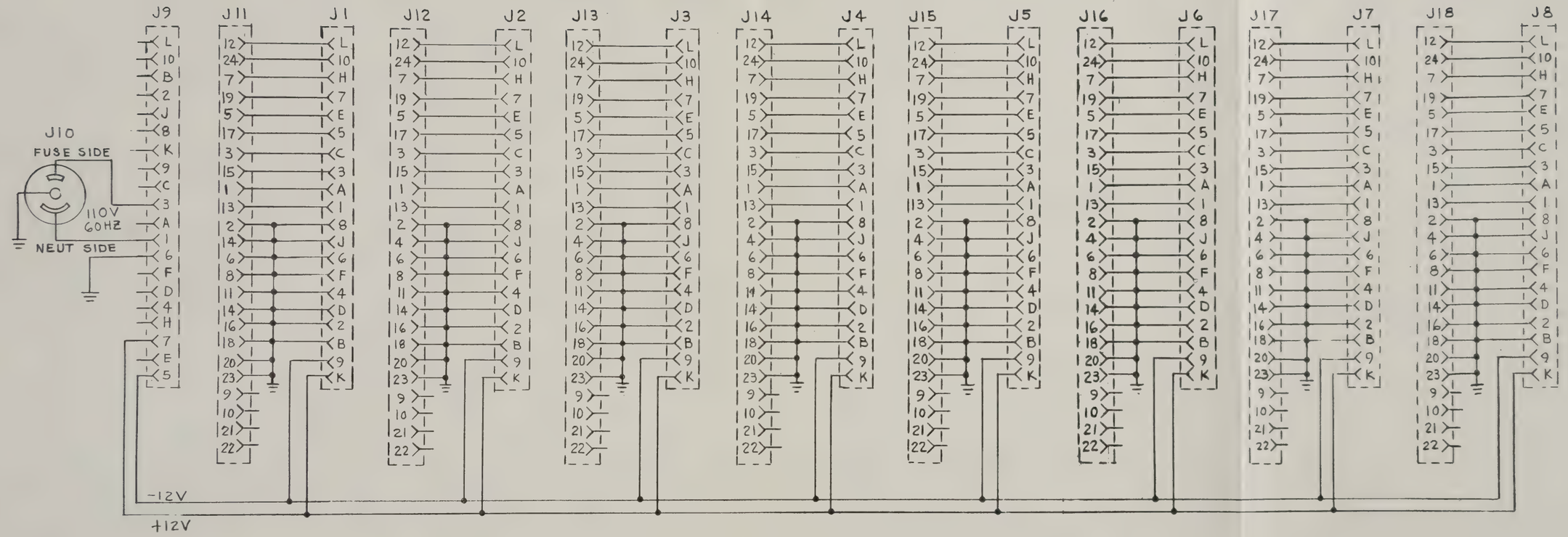
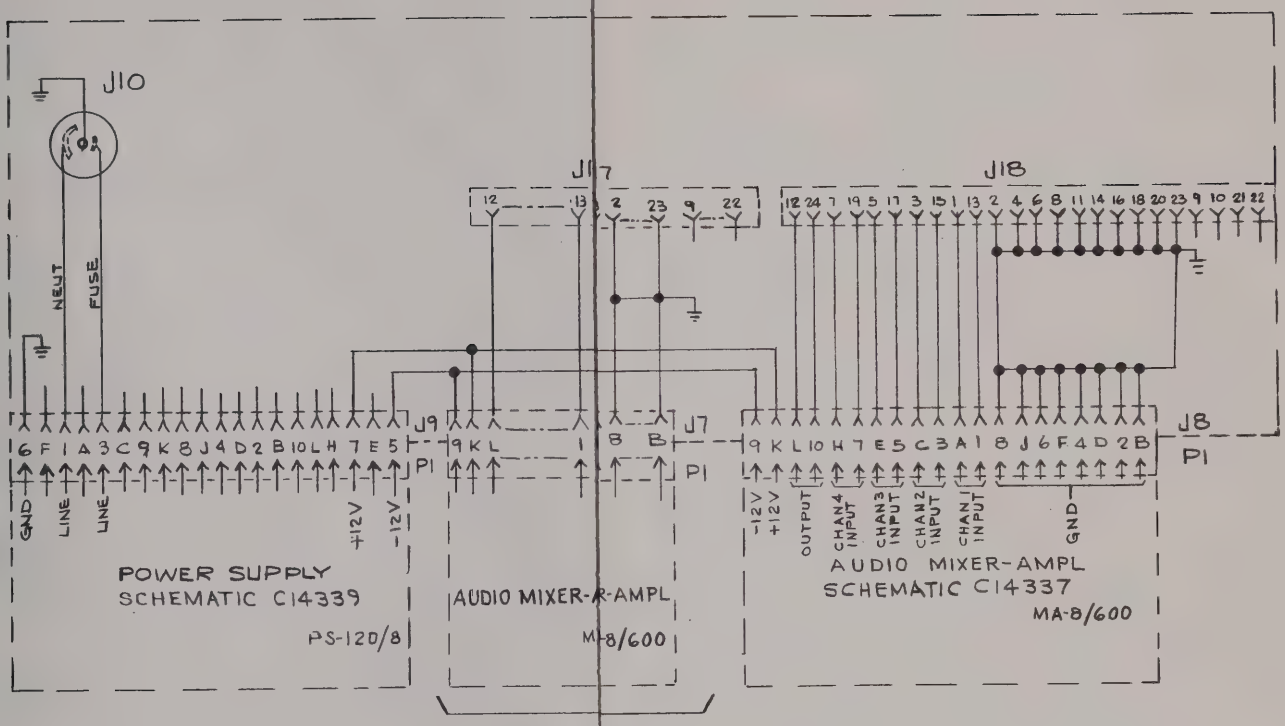
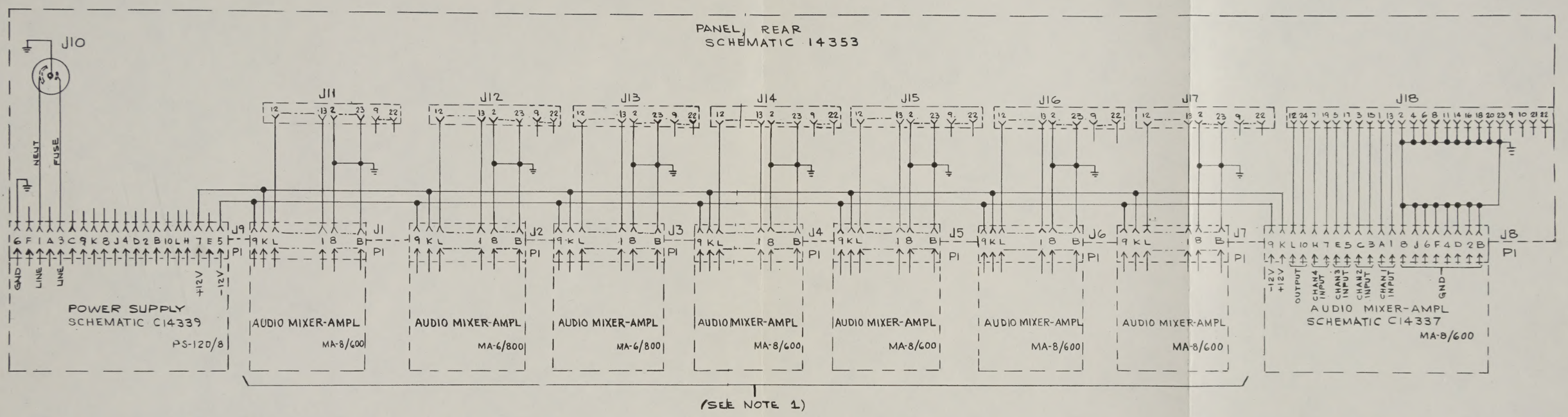


Fig. 9-3. Main Chassis, MAC-8/600
Schematic Diagram



NOTES -
1- P1 TO J8 TO J18 THRU
ARE SCHEMATICALLY THE SA
TO REAR PANEL CIRCUITS E

Fig. 9-4. Mixing Amplifier Assembly, MAA-8/600, Schematic Diagram



NOTES -
1- P1 TO J8 TO J18 THRU P1 TO J1 TO J11, ARE SCHEMATICALLY THE SAME FOR ALL MA-8/600 MODULES TO REAR PANEL CIRCUITS EXCEPT AS SHOWN

Fig. 9-4. Mixing Amplifier Assembly, MAA-8/600, Schematic Diagram